NAR-5650 Series
Communication Appliance

User's Manual

Revision: 1.0

CE

This certificate of conformity of NAR-5650 series with actual required safety standards in accordance with 89/366 ECC-EMC Directive and LVD 73/23 ECC

UL

This product meets all safety requirements per UL60950 standard.

CASWELL. Inc.
7F, No. 186, Jian-Yi Rd., Chung-Ho city, 235,Taipei,Taiwan, R.O.C.
Headquarter: +886-2-5591-1999 FAX: +886-2-5591-1666
http://www.cas-well.com

TÜV CERT ISO 9001

Table of Contents

Chapter 1 Introduction 2

1.1 About This Manual 2

1.2 Manual Organization 2

1.3 Technical Support Information 3

1.4 Board Layout 3

1.5 System Block Diagram 4

1.6 Product Specifications 4

Chapter 2 Getting Started 7

2.1 Included Hardware 7

2.2 Before You Begin 7

2.3 The Chassis 8

2.4 Open the Chassis 8

2.5 Install 3.5" Hard disk 9

2.6 Install EZIO 10

2.7 Install a Different Processor 11

2.8 Install and Remove DIMM 13

2.9 Remove and Install Compact Flash Card 14

2.10 Remove and Install Battery 14

2.11 Ear Mount Kit Installation 15

2.12 Hardware Configuration Setting 16

2.13 Use a Client Computer 18

Chapter 3 BIOS Setting 20

BIOS Setup Information 20

Chapter 4 EZIO Programming Guide 27

4.1 About EZIO3 27

4.2 Features 27

4.3 Technical Support Information 27

4.4 Mechanical Specification 28

4.5 General Specification 28

4.6 Product Outlook 28

4.7 Interface Pin Assignment 28

4.8 Hardware installation 29

4.9 EZIO3 Function Command 30

4.10 Character Generator ROM (CGROM) 33

4.11 Sample Codes 34

Chapter 1 Introduction

1.1 About This Manual

This manual contains all required information for setting up and using the NAR-5650 series.

NAR-5650 provides the essential platform for delivering optimal performance and functionality in the value communications appliance market segment. This manual should familiarize you with NAR-5650 operations and functions. NAR-5650 series provide up to eight on-board Ethernet ports to serve communication applications like Firewall, requiring up to twenty four Ethernet ports(in 2U Chassis)to connect external network (internet), demilitarized zone and internal network.

NAR-5650 series overview:

- Support 3000 series Xeon ,Dual Core Xeon, Quad Core Xeon CPU
- Up to 8GB DDR2 667/800 DIMM
- Up to four USB ports and One COM ports
- Two SATA connectors for SATA HD
- one CF card slot
- Up to two PCI-E x8 interfaces(in 2U Chassis)
- Provides absolute high flexibility of customized I/O configuration
- Three sets and Generation 2.0 By-pass functions.

WARNING!

1. **"CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS"**

2. **This guide is for technically qualified personnel who have experience installing and configuring system boards. Disconnect the system board power supply from its power source before you connect/ disconnect cables or install/ remove any system board components. Failure to do this can result in personnel injury or equipment damage.**

3. **Avoid short-circuiting the lithium battery; this can cause it to superheat and cause burns if touched.**

4. **Do not operate the processor without a thermal solution. Damage to the processor can occur in seconds.**

5. **Do not block air vents. Minimum 1/2-inch clearance required.**

1.2 Manual Organization

This manual describes how to configure your NAR-5650 system to meet various operating requirements. It is divided into four chapters, with each chapter addressing the basic concept and operation of this system.

Chapter 1: Introduction. This section describes how this document is organized. It includes brief guidelines and overview to help find necessary information.

Chapter 2: Hardware Configuration Setting and Installation. This chapter demonstrated the hardware assembly procedure, including detailed information. It shows the definitions and locations of Jumpers and Connectors that can be used to configure the system.

Chapter 3: This section describes how to use BIOS functions .

Chapter 4: This section describes how to programming EZIO software.

Any updates to this manual, would be posted on the web site:

http://www.cas-well.com/products/index.php

1.3 Technical Support Information

Users may find helpful tips or related information on Caswell's web site: ***http://www.cas-well.com*** A direct contact to Caswell's technical person is also available. For further support, users may also contact Caswell's headquarter in Taipei or local distributors.

Taipei Office Phone Number: +886-2-55911999

1.4 Board Layout

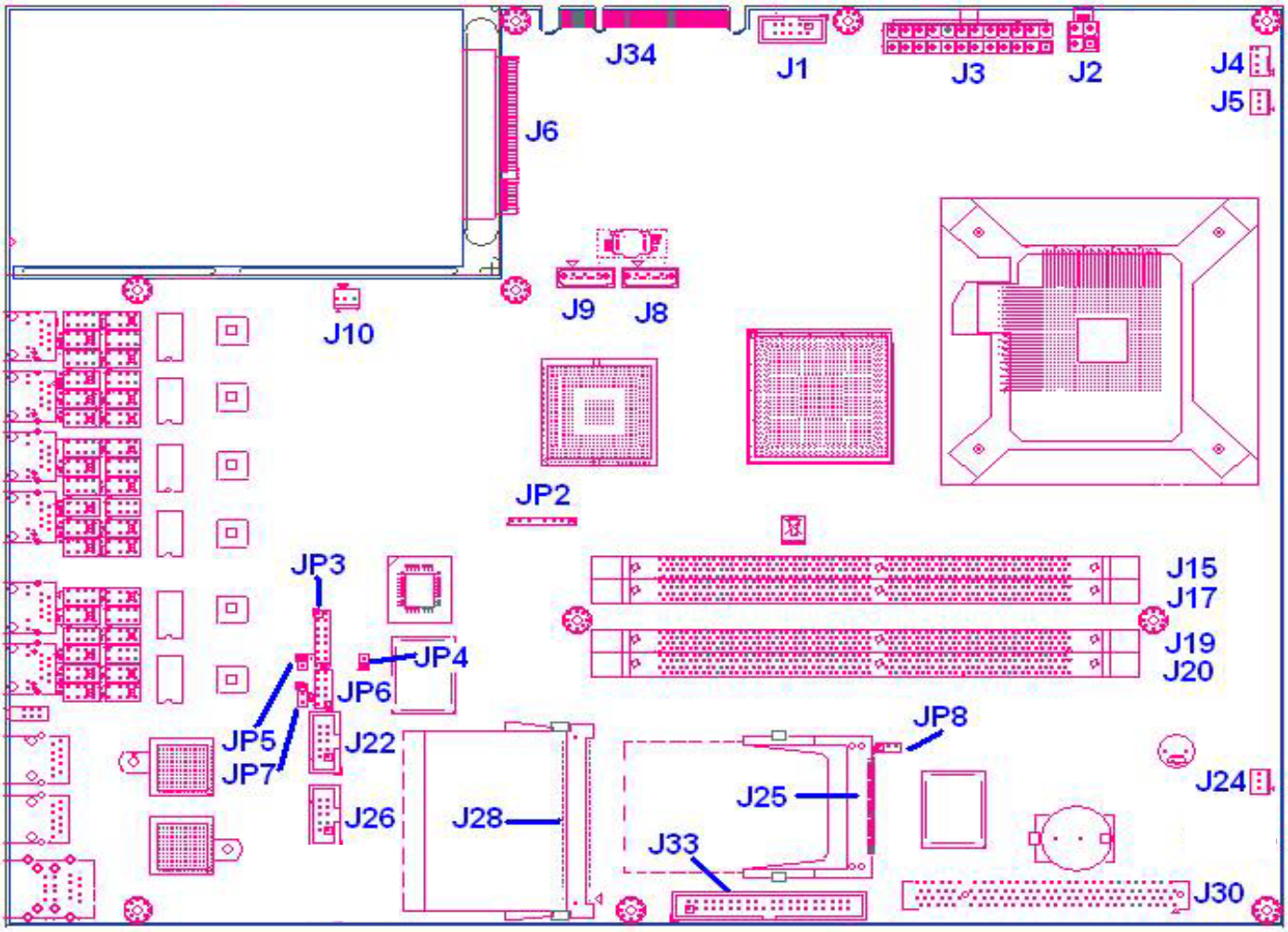
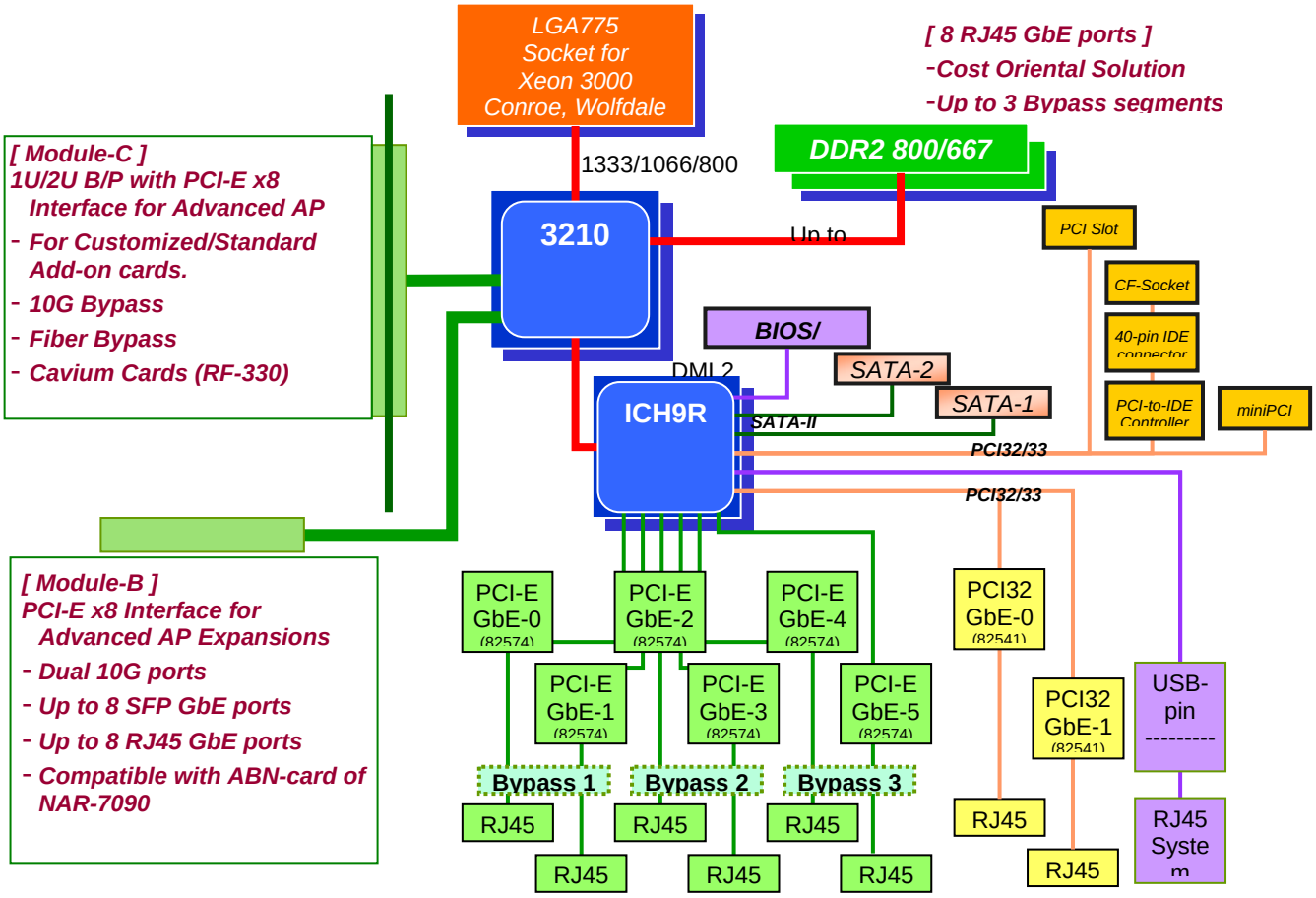


Figure 1-1 Board Layout of NAR-5650 M/B

1.5 System Block Diagram



1.6 Product Specifications

#	Requirement	Detailed Description
1	System Description	NAR-5650 system series is single Xeon system based on Intel® 3210+ICH9R chipset with optional configuration to meet market requirements in-between top-P4 and high-end Xeon platform segments. It should be migration model of current NAR-5071, -5077 and -7050E system series. Three basic series: (1) 1U rackmount w/ single PSU – 1st priority. (2) 1U rackmount w/ redundant PSU – design ready for project. (3) 2U rackmount w/ redundant PSU – 2nd priority, for certain regional market.
2	CPU	Supports LGA 775 Server CPUs, including 3000 series Xeon and 6000, 8000, 9000 series desktop CPUs. Core base cover up to 65nm Conroe, Kentsfield and 45nm Wolfdale and Yorkfield.
3	CPU Board	◆ PPAP-3762VL with Intel® 3210 chipset ◆ Board size: 304.8x381mm / 12”x15”
4	System Memory	◆ 4 DIMM slot supports up to 8 GB ◆ Supports un-buffered ECC DDR2 800/667
5	Power Supply	◆ Three form factor will be required: (1) 1U single (2) 1U redundant (3) 2U redundant. ◆ Full range ATX PSU with total 300W power output will be required (depends on power-budget). ◆ AC On/Off switch is required. ◆ Certification: CE, UL, 3C ◆ Operating Mode: AT with power switch. ATX with power button. ◆ Dimension: (1) 1U single PSU - 102(W) x 190(D) x 40 (H) mm

#	Requirement	Detailed Description
		(2) 1U redundant PSU - 106(W) x 400(D) x 40 (H) mm (3) 2U redundant PSU - 105(W) x 310(D) x 80 (H) mm
6	Chassis	◆ Form factor: 1U / 2U rack-mount chassis with a (rear) supporting bracket (trail) system (kit). ◆ To accommodate: M/B, EZIO-3, PSU, one 3.5" HDDs, advanced Ethernet I/O module (ABN-458, ABN-668, ABN-522…), PCI-E add-on card which is connected through backplane. ◆ Chassis depth: (1) 1U w/ single PSU <18". (2) 1U w/ redundant PSU < 20" (3) 2U w/ redundant PSU < 19"
7	PCI-E Architecture	◆ One PCI-E x8 from N/B (3210) to on-board golden-finger for direct connection with proprietary PCI-E/PCIX add-on modules (ABN-series). ◆ The other PCI-E x8 from N/B (3210) to golden-finger on left side for connection with PCI-E/PCI-X backplane for expansion. ◆ 6 PCI-E x1 from S/B (ICH9R) are configured in two types (two mother boards) - Connect directly to six PCI-E x1 GbE controller 82574 w/ RJ45 connector. - 2 of the six lanes connect directly to PCI-E x1 Eth. Controller (82574) and the other 4 lanes are integrated to one PCI-E switch (PLX 8508) and connected to two 82571EB (x2 for each).
8	Ethernet	◆ Onboard built with max. 8 GbE ports & 3 bypass segments: ✓ 6 PCI-E x1 (82574) + 2 PCI32 (82541PI), 3 bypass segments. (CPU-board PPAP-3762L-0830) ✓ 2 PCI-E x2 (82571) SFP + 2 PCI-E x2 (82571) RJ45 + 2 PCI-E x1 (82574) RJ45 + 2 PCI32 (82541PI) ports, 2 bypass segments. (CPU-board PPAP-3762L-2620) ✓ 4 PCI-E x2 (82571) SFP + 2 PCI-E x1 (82574) RJ45 + 2 PCI32 (82541PI) ports, 1 bypass segments. (CPU-board PPAP-3762L-4410) ◆ iAMT feature shall be supported by project.
9	Expansion slots	◆ Two PCI-E x8 interfaces from N/B shall be configured as followed: ✓ One PCI-E x8 golden finger on front-left of the CPU board for direct connection with proprietary PCI-E add-on modules (ABN-series). ✓ The other PCI-E x8 golden-finger on left edge for connection with PCI-E/PCI-X backplane for expansion. ◆ One onboard Mini PCI socket is required. ◆ One standard PCI slot for testing and programming.
10	SATA & IDE Interfaces	◆ One IDE channel shall be converted from PCI bus and supports one Compact Flash Socket and a 40-pin pin-header. ◆ A jumper for device-selection between CF socket and 40-pin IDE connector of the IDE channel is required. ◆ The IDE interface shall support DMA mode. ◆ Two SATA Interfaces on board with lockable connectors (B6210691)
11	Storage	◆ HDD ■ System is equipped default with fixed HDD ■ Space for one 3.5" SATA HDD is required. ◆ On board Type-1 CF socket for CF card.
12	VGA Interface	◆ By request the VGA feature can be implemented through MiniPCI Module. No onboard VGA to be built. ◆ A semi-cutting hole for standard D-Sub 15-pin VGA connector on chassis.
13	Power On/Off operation	◆ There should be an on/off switch on PSU itself or a separated on/off switch attached to PSU to turn the PSU on/off; this switch is for AT mode operation. ◆ There should be a toggle switch pin-header to allow ATX model operation. ◆ There is an "always on" item in the BIOS. System will be powered up automatically while power is resumed, if it is "on" before power failed. ◆ Customer can use OS command to shut down system power. More detailed Power on/off mode to be determined.
14	Front Panel	◆ EZIO-III ◆ 8 RJ-45 connectors for PCI-E & PCI32 GbE interfaces. The four on LHS should be co-built for RJ45 and SFP.

#	Requirement	Detailed Description
		◆ Ethernet I/O sequence: from LHS to RHS. ◆ One integrated connector with dual-USB connector and RJ45 connector for system console, tab-down, no LED. ◆ The Dual-USB connector should be optional. ◆ Hardware Reset Button ◆ Factory Default button (optional) ◆ Reserved Power button for project inquiry. ◆ LED: Signaling standard - System LED: Power, Data access. - Ethernet LED: For every Ethernet interface there should be LEDs for link status and speed of LAN-ports. ◆ Bypass LED
15	Rear Panel	◆ Reserved semi-cutting opening of D-Sub 15 connector. ◆ AC power inlet ◆ Power on/off switch ◆ Opening for system ventilation (fan).
16	Chassis Color	◆ Standard Pantone Black-UC
17	Dimension	(1) 431.8/17” (W) x 457/18” (D) x 44 (H) (2) 431.8/17” (W) x 500/20” (D) x 44 (H) (3) 431.8/17” (W) x 482/19” (D) x 44 (H)

Chapter 2 Getting Started

This section describes how the hardware installation and system settings should be done.

2.1 Included Hardware

The following hardware is included in package:

- NAR-5650 Communication Appliance System
- One null serial port cable

2.2 Before You Begin

To prevent damage to any system board, it is important to handle it with care. The following measures are generally sufficient to protect your equipment from static electricity discharge:

When handling the board, use a grounded wrist strap designed for static discharge elimination and touches a grounded metal object before removing the board from the antistatic bag. Handle the board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

When handling processor chips or memory modules, avoid touching their pins or gold edge fingers. Restore the communications appliance system board and peripherals back into the antistatic bag when they are not in use or not installed in the chassis.

Some circuitry on the system board can continue operating even though the power is switched off. Under no circumstances should the Lithium battery cell used to power the real-time clock be allowed to be shorted. The battery cell may heat up under these conditions and present a burn hazard.

WARNING!

1. **"CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS"**
2. **This guide is for technically qualified personnel who have experience installing and configuring system boards. Disconnect the system board power supply from its power source before you connect/disconnect cables or install/remove any system board components. Failure to do this can result in personnel injury or equipment damage.**
3. **Avoid short-circuiting the lithium battery; this can cause it to superheat and cause burns if touched.**
4. **Do not operate the processor without a thermal solution. Damage to the processor can occur in seconds.**
5. **Do not block air vents. Minimum 1/2-inch clearance required.**

2.3 The Chassis

The system is integrated in a customized 1U chassis (***Fig. 2-1, Fig. 2-2***). On the front panel you will find a 4-push-button LCD module (EZIO), right LAN ports, two USB ports and a Console port.

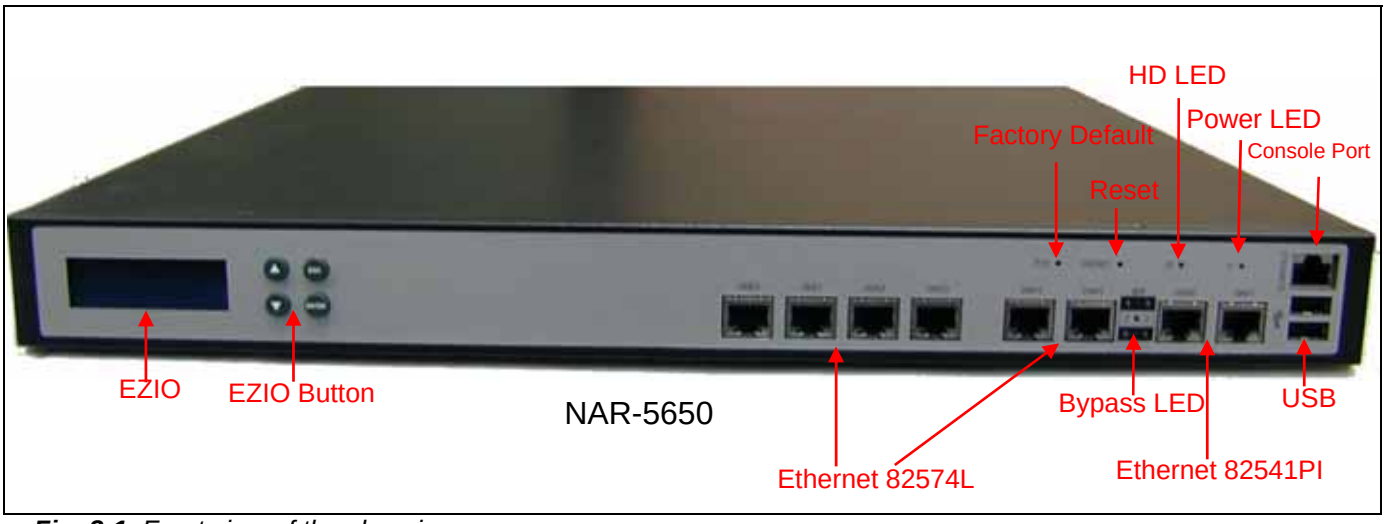


Fig. 2-1 *Front view of the chassis*

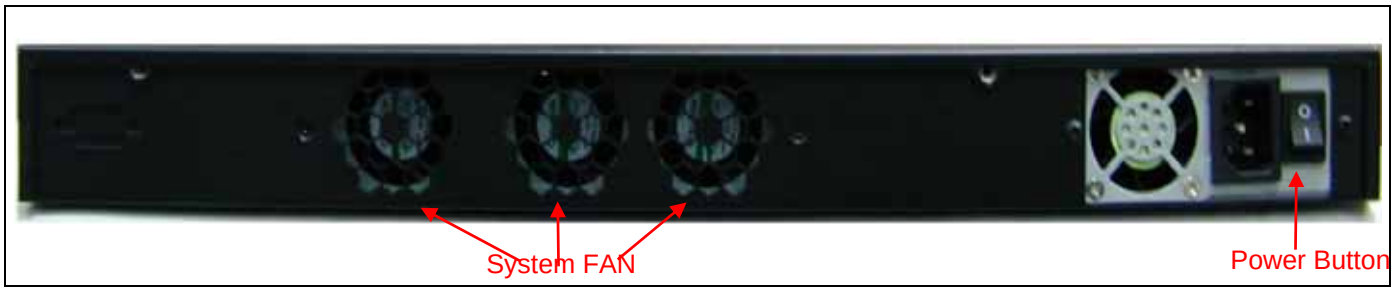


Fig. 2-2 *Rear view of the chassis*

2.4 Open the Chassis

1. Loosen the 6 screws of the chassis, four on each side and the rest two on the back, to remove the top lead (***Fig. 2-3***).

Fig. 2-3 *Take off screws*

2. The top lead (***Fig. 2-4***) can be removed from the base stand (***Fig. 2-5***).

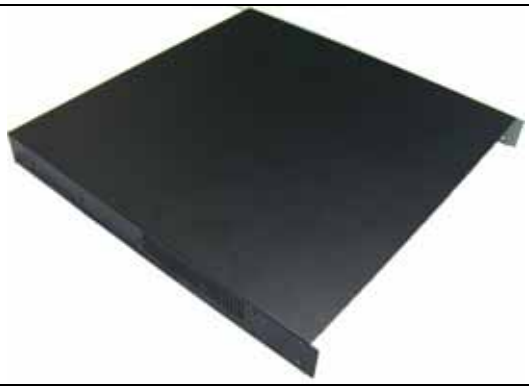


Fig. 2-4 *The top lead*

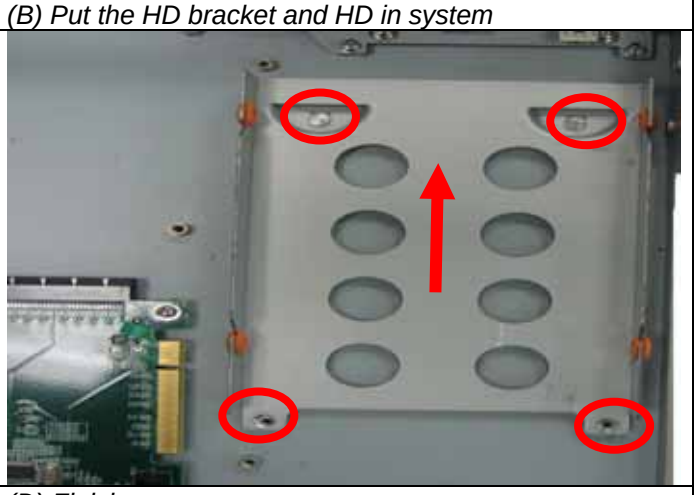
Fig. 2-5 *The base stand*

2.5 Install 3.5" Hard disk

The system has an internal drive bay for one 3.5" hard disk drive. If the HDD is not pre-installed, you can install by yourself. They are one HDD-bracket, several screws, one SATA cable

(A) Put the HD on the HD bracket and fix all screws

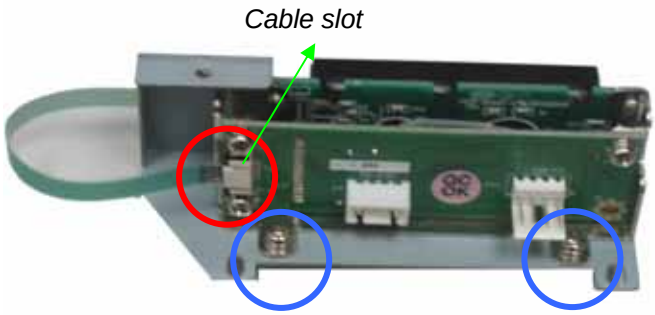
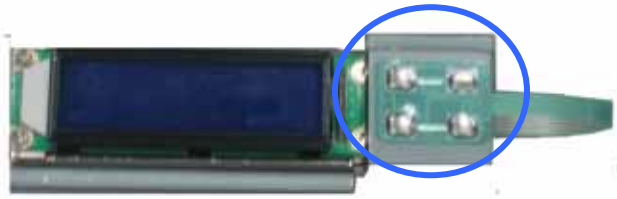
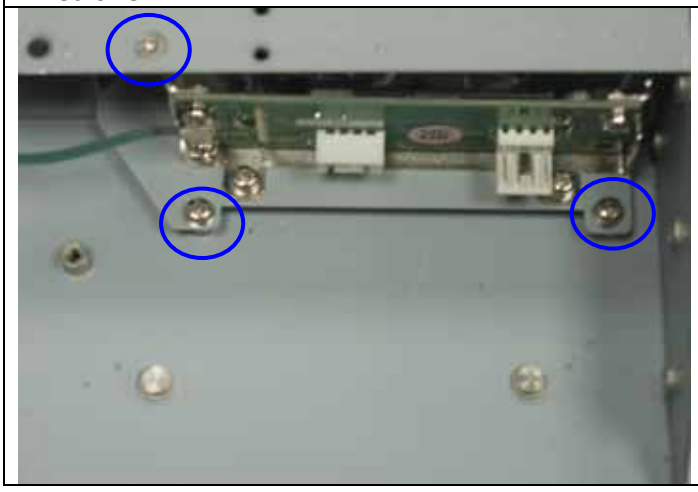
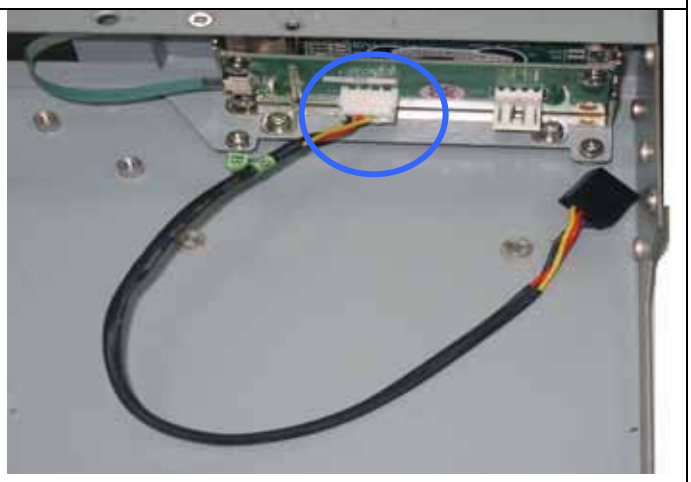
(B) Put the HD bracket and HD in system



(C) Fix two screws

(D) Finish

2.6 Install EZIO

(A)EZIO	(B) EZIO bracket
(C) 1.Install the EZIO in the EZIO bracket and fix all screws. 2.Install the button cable of EZIO in Cable slot	(D) To paste the EZIO Button in bracket.
	
(E) Install the EZIO kit assembly in Chassis ,and fix all screws.	(F) To connect the EZIO Cable
	

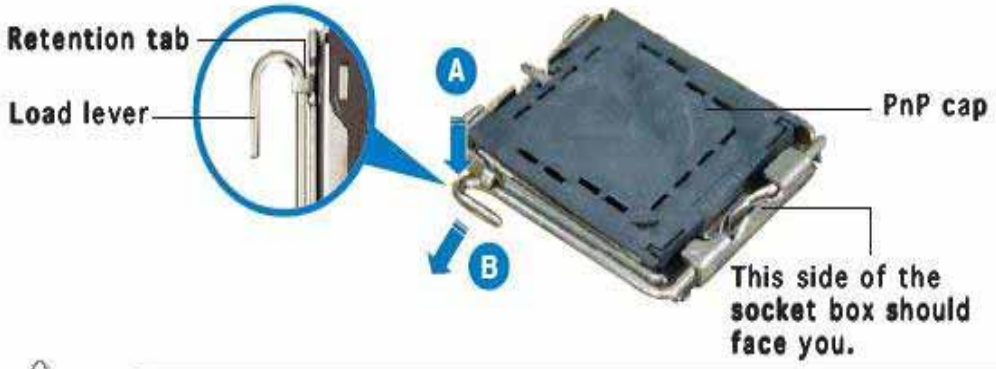
To install a CPU

1. Local the CPU socket on the motherboard

NAR-5650 CPU socket 775

Before installing the CPU, make sure that the socket box is facing towards you and the load lever is on your left.

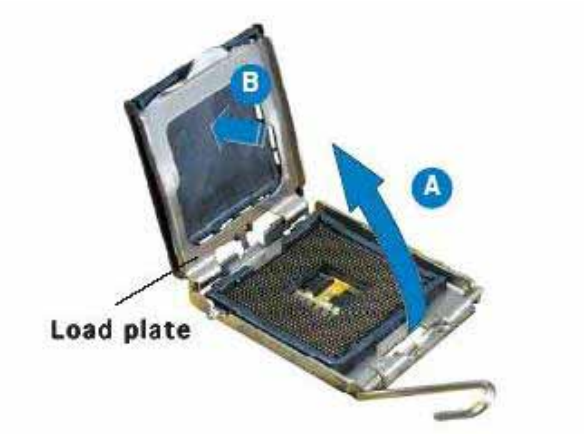
2. Press the load lever with your thumb (A), then move it to left (B) until it is released from the retention tab



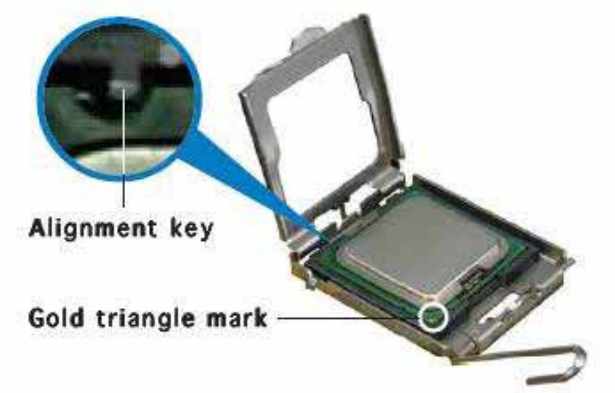
To prevent damage to the socket pins, do not remove the PnP cap unless you are installing a CPU.

3. Lift the load lever in the direction of the arrow to a 135° angle

4. Lift the load plate with your thumb and forefinger to a 100° angle (A), then push the PnP cap from the load plate window to remove (B)



5. Position the CPU over the socket, making sure that the gold triangle is on the bottom-left corner of the socket. The socket alignment key should fit into the CPU notch



6. Close the load plate (A), then push the load lever (B) until it snaps into the retention tab

The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

Configure Processor Speed

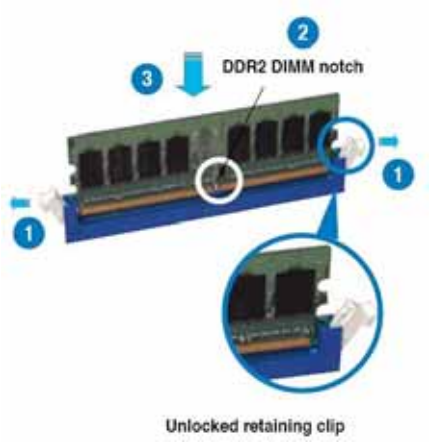
The system was designed to self-detect its CPU speed. So it does not require any system adjustment.

2.8 Install and Remove DIMM

Follow these steps to upgrade RAM module:

Make sure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1. Unlock a DIMM socket by pressing the retaining clips outward
2. Align a DIMM on the socket such that the notch on the DIMM matches the break on the socket

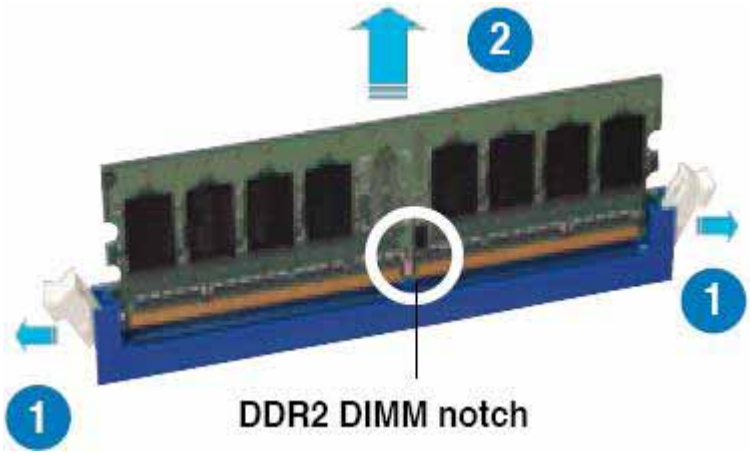


3. Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated

- A DDR2 DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket to avoid damaging the DIMM.

Follow these steps to remove a DIMM:

1. Simultaneously press the retaining clips outward to unlock the DIMM



2. Remove the DIMM from the socket

2.9 Remove and Install Compact Flash Card

Compact Flash Card

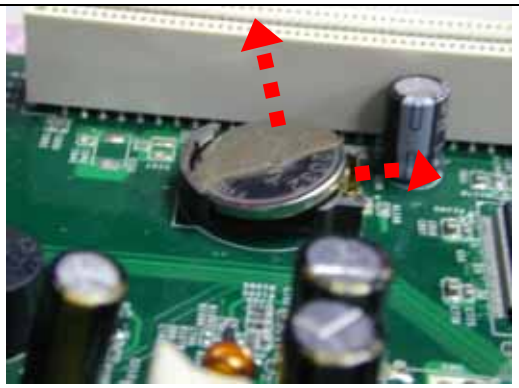
Insert Compact Flash Card into the CF interface

Completion of Compact Flash Card connection

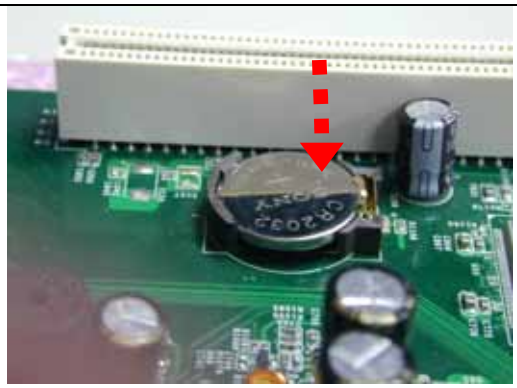
2.10 Remove and Install Battery

Press the metal clip back to eject the button battery

Replace it with a new one by pressing the battery with fingertip to restore the battery



Eject the battery

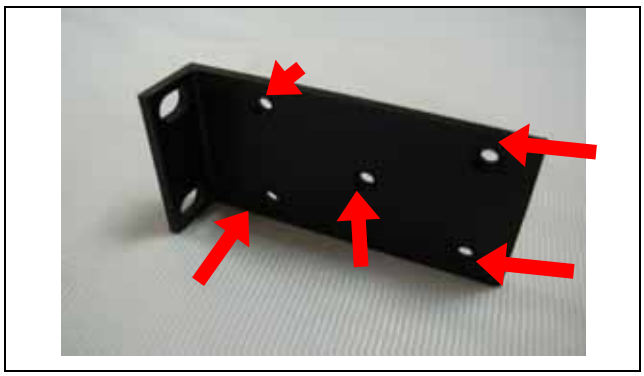


Restore the battery

2.11 Ear Mount Kit Installation

The NAR-5650 series shipped with 2 ear mount kits. The following is the installation instruction of these ear mounts:

1. Take out the L shape ear mount kits. One ear mount fits on one side of the chassis,
2. Placing the side with four holes agonists the chassis and the side with two holes face outward.
3. Fasten five screws on each side

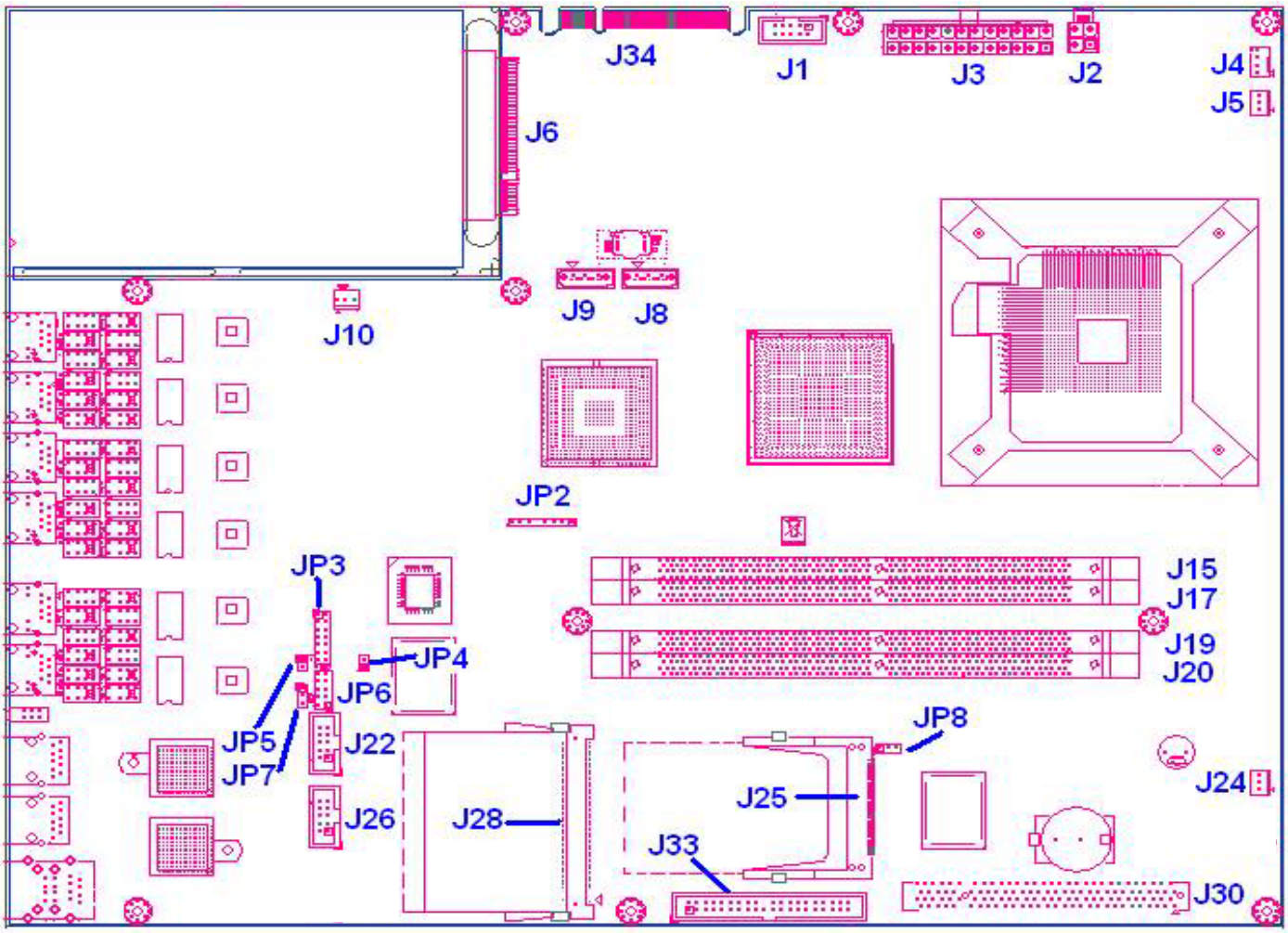


Fasten the screws to the side

2.12.1 NAR-5650 System Board Jumper

In general, jumpers on NAR-5650 system board are used to select options for certain features. Some of the jumpers are configurable for system enhancement. The others are for testing purpose only and should not be altered. To select any option, cover the jumper cap over (Short) or remove (NC) it from the jumper pins according to the following instructions. Here NC stands for “Not Connected”.

Location of Jumpers



PPAP-3762L ZR2 Jumper settings: (default setting:”★”)

JP1: CMOS Clear

JP1	Function
1-2 Short	Normal Operation ★
2-3 Short	Clear CMOS Contents

JP7:GPIO Voltage Select

JP7	Function
1-2 Short	+5v ★
2-3 Short	+3.3v

JP5:Watch Dog Timer(WDT) Select

JP5	Function
1-2 Short	Enable WDT Function ★
1-2 Open	Disable WDT Function

JP4: Case Open Function

JP4	Function
Pin1	Case Open
Pin 2	GND

JP8:CF Card Select

JP8	Function
1-2 Short	Master ★
2-3 Short	Slave

Connector	Function	Remark
J4	CPU FAN connector	
J5、J24	SYS FAN connector	
J8、J9	SATA connector	
J22	USB connector	
J1	COM2 connector	
J26	K/B、M/S connector	
JP6	8-bit GPIO connector	
J30	PCI connector	Reserved
J33	IDE connector	
J25	CF connector	
J15, J17,J19,J20	Memory Slot	
JP3	PWR & HDD LED, PWR ON, REST, LDF	
J10	SYS FAN connector	Reserved

JP6: 8-bit GPIO connector definition

Pin	Signal Name	Pin	Signal Name
1	GPIO	2	GPIO
3	GPIO	4	GPIO
5	GPIO	6	GPIO
7	GPIO	8	GPIO
9	Ground	10	+5V or +3.3V

JP3: PIN definition

Pin	Signal Name	Pin	Signal Name
1	HD+(+5V)	2	GP+(+5V)
3	HD-	4	YP+
5	GND	6	PWR SW
7	RSET	8	GND
9	DEFAULT-	10	GND
11	RSV	12	RSV
13	RSV	14	RSV

2.13 Use a Client Computer

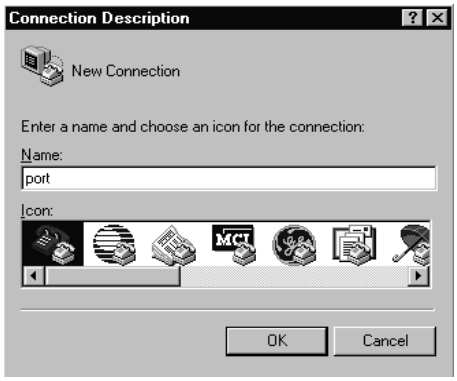
Connection Using Hyper Terminal

If users use a headless NAR-5650 system, which has no mouse/keyboard and VGA output connected to it, the console may be used to communicate with NAR-5650.

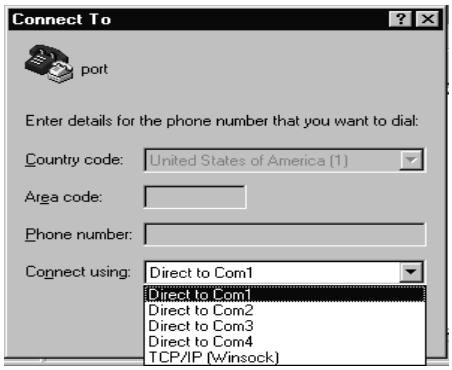
To access NAR-5650 via the console, Hyper Terminal is one of many choices. Follow the steps below for the setup:

Note: Terminal software may need to update for correct console output.

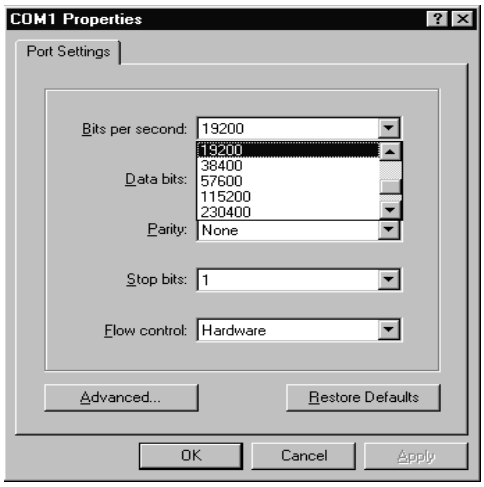
1. Execute HyperTerminal under C:\Program Files\Accessories\HyperTerminal
2. Enter a name to create new dial



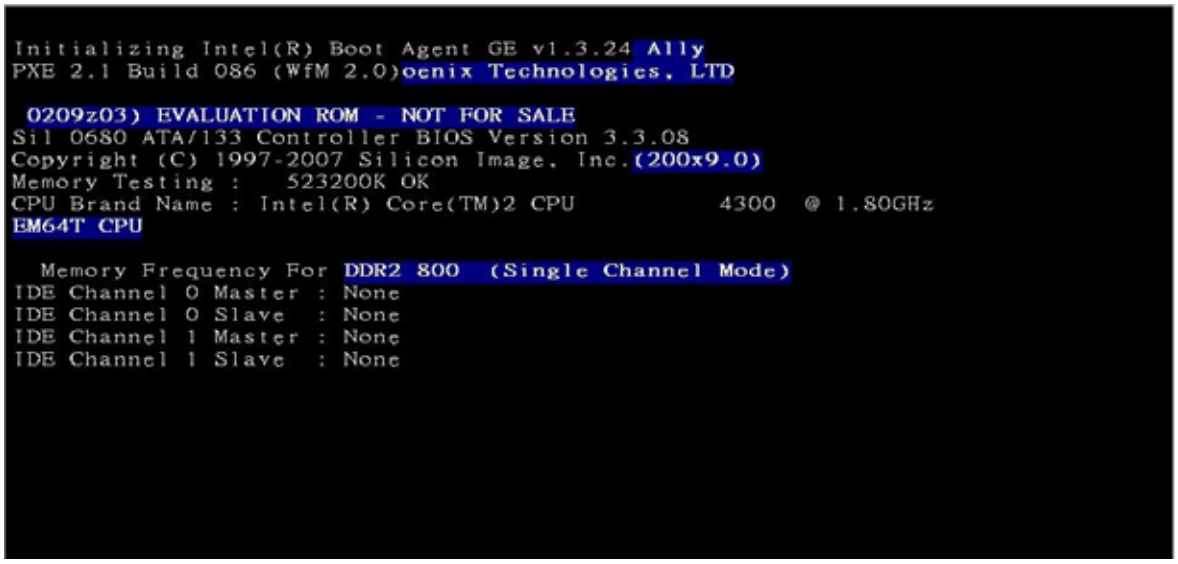
3. For the connection settings, make it Direct to Com1.



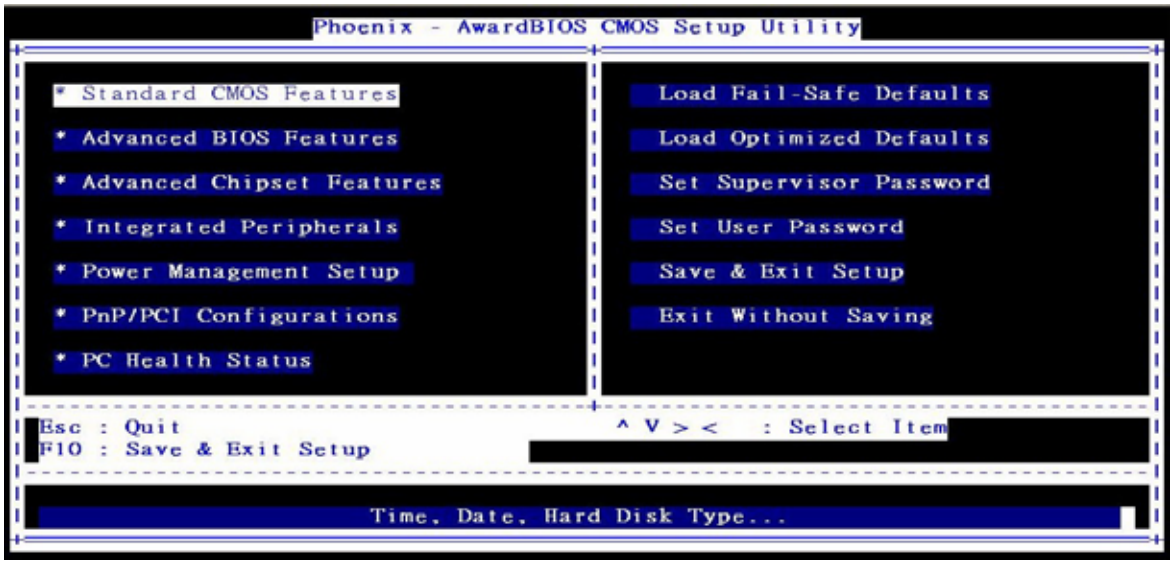
4. Please make the port settings to Baud rate 19200, Parity None, Data bits 8, Stop bits 1



5. Turn on the power of NAR-5650 system, after following screen was shown:


Initializing Intel(R) Boot Agent GE v1.3.24 Ally
PXE 2.1 Build 086 (WfM 2.0)ocnix Technologies, LTD
0209z03) EVALUATION ROM - NOT FOR SALE
Sil 0680 ATA/133 Controller BIOS Version 3.3.08
Copyright (C) 1997-2007 Silicon Image, Inc.(200x9.0)
Memory Testing : 523200K OK
CPU Brand Name : Intel(R) Core(TM)2 CPU 4300 @ 1.80GHz
EM64T CPU
Memory Frequency For DDR2 800 (Single Channel Mode)
IDE Channel 0 Master : None
IDE Channel 0 Slave : None
IDE Channel 1 Master : None
IDE Channel 1 Slave : None

6. You can then see the boot up information of NAR-5650.


Phoenix - AwardBIOS CMOS Setup Utility
* Standard CMOS Features
* Advanced BIOS Features
* Advanced Chipset Features
* Integrated Peripherals
* Power Management Setup
* PnP/PCI Configurations
* PC Health Status
Load Fail-Safe Defaults
Load Optimized Defaults
Set Supervisor Password
Set User Password
Save & Exit Setup
Exit Without Saving
Esc : Quit
F10 : Save & Exit Setup
^ V > < : Select Item
Time, Date, Hard Disk Type...

7. When message “Hit <DEL> if you want to run Setup” appear during POST, after turning on or rebooting the computer, press **<Tab>** key ***immediately*** to enter BIOS setup program.

This is the end of this section. If the terminal did not port correctly, please check the previous steps.

Chapter 3 BIOS Setting

BIOS Setup Information

NAR-5650 is equipped with the Award BIOS within Flash ROM. The BIOS has a built-in setup program that allows users to modify the basic system configuration easily. This type of information is stored in CMOS RAM so that it still retains during power-off periods. When system is turned on, NAR-5650 communicates with peripheral devices and checks its hardware resources against the configuration information stored in the CMOS memory. Whenever an error is detected, or the CMOS parameters need to be initially defined, the diagnostic program will prompt the user to enter the Setup program. Some errors are significant enough to abort the start-up.

When you see the message “Hit <DEL> if you want to run Setup”, after turning on or rebooting the computer, press <Del> key ***immediately*** to enter BIOS setup program.

If you want to enter Setup but fail to respond before the message disappears, please restart the system either by first turning it off and followed by turning it on (COLD START) or simply press the "RESET" button. “WARM START” (press <Ctrl>, <Alt>, and <Delete> keys simultaneously) will do, too. Unless you press the keys at the right time, the system will not boot, an error message will display and you will be asked to do it again.

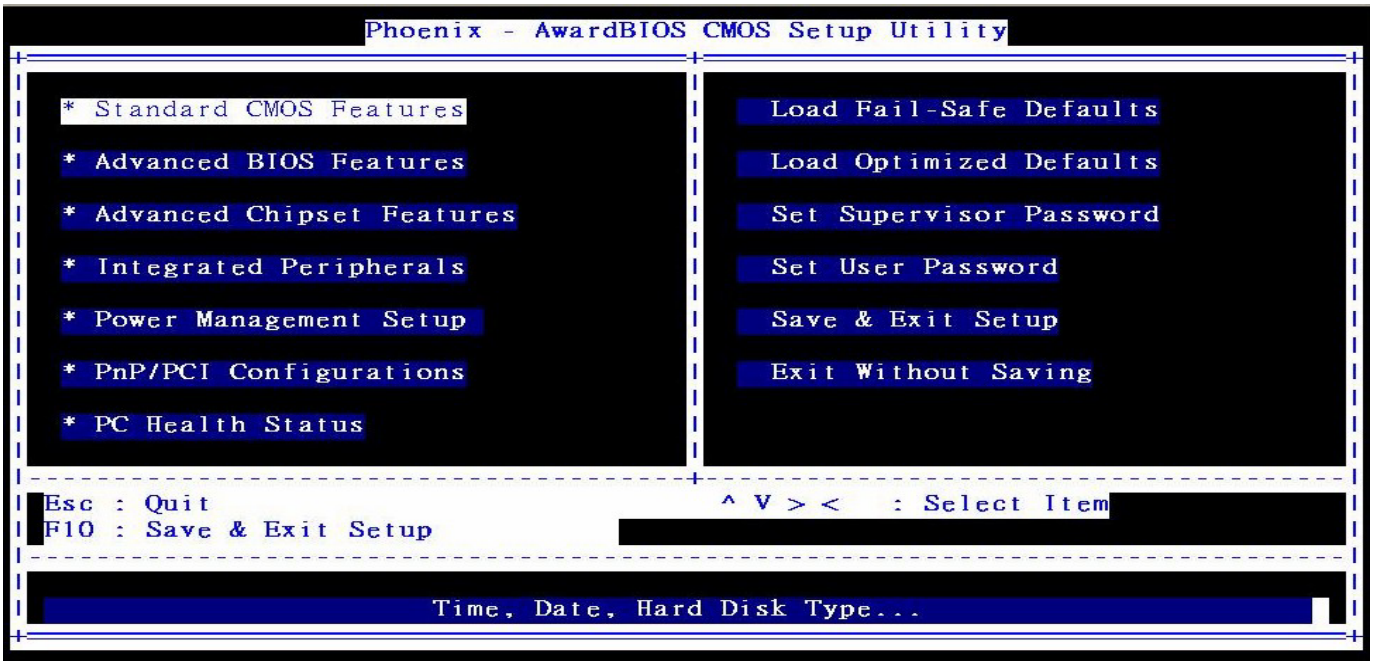
When no setting is stored in BIOS or the setting is missing, a message “Press <F1> to run Setup” will appear. Then press <F1> to run Setup or resume HIFLEX BIOS Setup. You can use the keyboard to choose among options or modify the system parameters to match the options with your system. The table shown on next page will show you all of keystroke functions in BIOS Setup.

Keys to navigate within Setup menu

Key	Function
Up (↑)	Move to the previous item
Down (↓)	Move to the next item
Left (→)	Move to the item on the left (menu bar)
Right (←)	Move to the item on the right (menu bar)
Enter	Enter the item you desired
PgUp	Increase the numeric value or make changes
PgDn	Decrease the numeric value or make changes
+	Increase the numeric value or make changes
-	Decrease the numeric value or make changes
Esc	**Main Menu:** Quit and not save changes into CMOS **Status Page Setup Menu and Option Page Setup Menu:** Exit current page and return to Main Menu
F1	General help on SETUP navigation keys
F10	Save all the CMOS changes and exit

Main Menu

Once you enter Award BIOS CMOS Setup Utility, the Main Menu (as figure below) will appear on the screen. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.

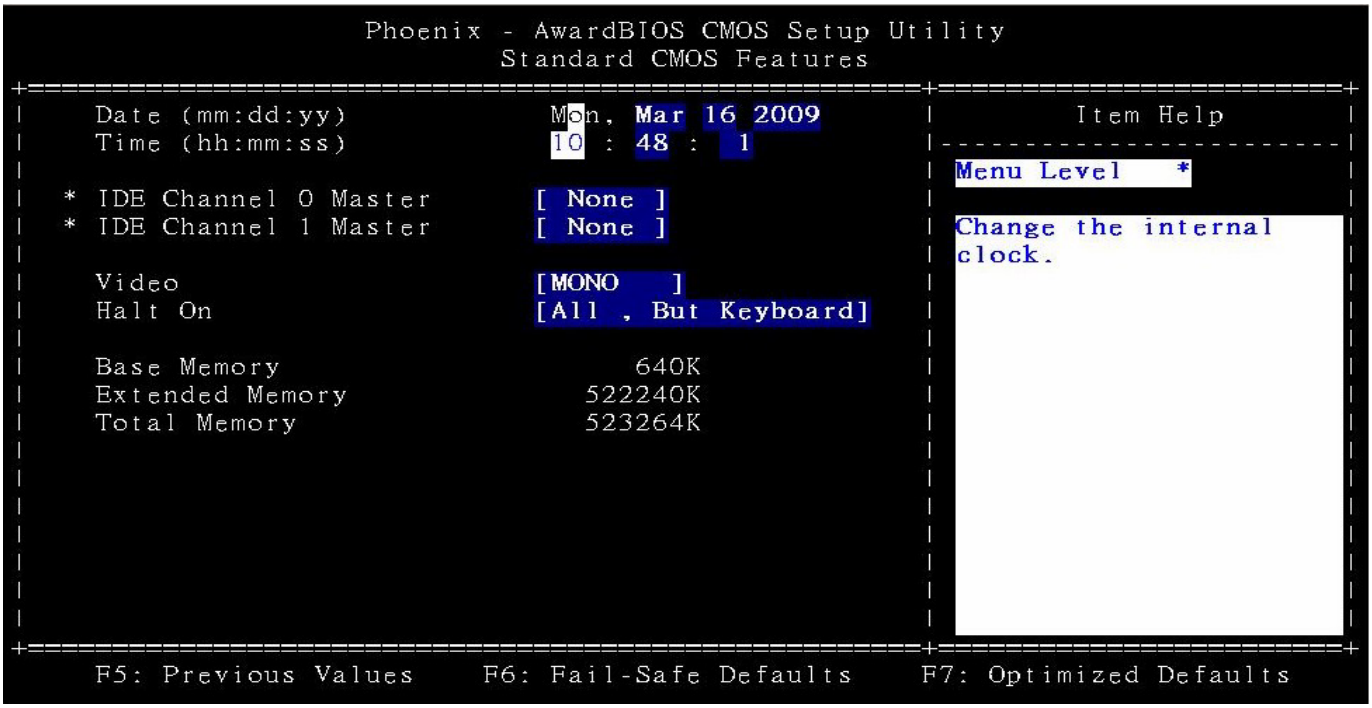

Phoenix - AwardBIOS CMOS Setup Utility
* Standard CMOS Features
* Advanced BIOS Features
* Advanced Chipset Features
* Integrated Peripherals
* Power Management Setup
* PnP/PCI Configurations
* PC Health Status
Load Fail-Safe Defaults
Load Optimized Defaults
Set Supervisor Password
Set User Password
Save & Exit Setup
Exit Without Saving
Esc : Quit
F10 : Save & Exit Setup
^ V > < : Select Item
Time, Date, Hard Disk Type...

Note: Please Load Optimized Defaults in the BIOS when somehow the system works not stable as usual. This action makes the system reset to the default for stability.

Standard CMOS Setup Menu

This setup page includes all the items within standard compatible BIOS. Use the arrow keys to highlight the item and then use the <PgUp>/<PgDn> or <+>/<-> keys to select the value or number you want in each item and press <Enter> to certify it.

Screen Shot: Phoenix – Award BIOS CMOS Setup Utility

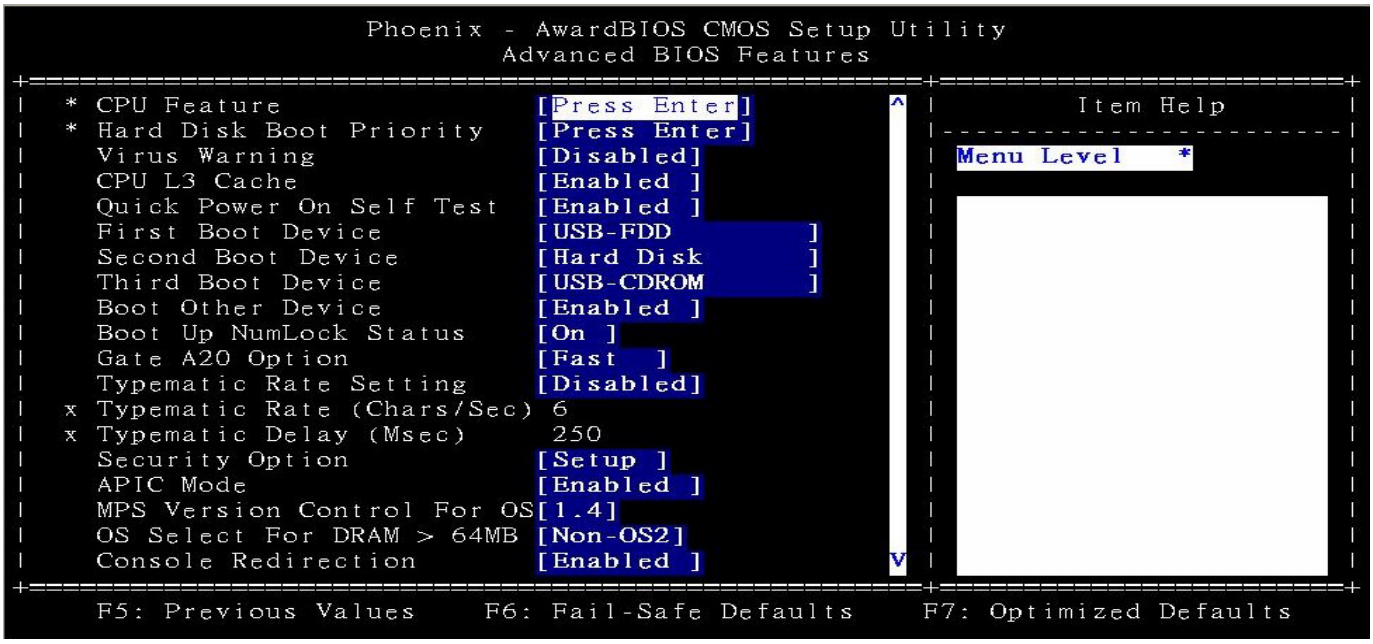

Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features
Date (mm:dd:yy) Mon, Mar 16 2009
Time (hh:mm:ss) 10 : 48 : 1
* IDE Channel 0 Master [None]
* IDE Channel 1 Master [None]
Video [MONO]
Halt On [All , But Keyboard]
Base Memory 640K
Extended Memory 522240K
Total Memory 523264K
Item Help
Menu Level *
Change the internal clock.
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

- **Date**
  The date format is <week>, <month>, <day>, <year>.
  - Week The week, from Sun to Sat, determined by the BIOS and is display only
  - Month The month, Jan. Through Dec.
  - Day The day, from 1 to 31 (or the maximum allowed in the month)
  - Year The year, from 2003 through 2098
- **Time**
  The times format in <hour> <minute> <second>. The time is calculated base on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00.
- **IDE Channel 0,1 Master**
  - IDE HDD Auto-Detection Press "Enter" to select this option for automatic device detection.
  - IDE Device Setup. You can use one of three methods:
    Auto Allows BIOS to automatically detect IDE devices during POST(default)
    None Select this if no IDE devices are used and the system will skip the automatic detection step and allow for faster system start up.
    Manual User can manually input the correct settings
  - Access Mode Use this to set the access mode for the hard drive. The four options are: CHS/LBA/Large/Auto(default:Auto)
  - Capacity Capacity of currently installed hard disk.
    Hard drive information should be labeled on the outside drive casing. Enter the appropriate option based on this information.
  - Cylinder Number of cylinders
  - Head Number of heads
  - Precomp Write precomp
  - Landing Zone Landing zone
  - Sector Number of sectors
- **Memory**
  The category is display-only which is determined by POST (Power On Self Test) of the BIOS.
  - **Base Memory**
    The POST of the BIOS will determine the amount of base (or conventional) memory installed in the system.
    The value of the base memory is typically 522240K for systems with 512M memory installed on the motherboard, or 1G for systems with 1G or more memory installed on the motherboard.
  - **Extended Memory**
    The BIOS determines how much extended memory is present during the POST.
    This is the amount of memory located above 1 MB in the CPU's memory address map.
  - **Total Memory**
    This item displays the memory size that used

Advance BIOS Features

This section allows user to configure your system for basic operation. Users will be able to select the system's default speed, boot-up sequence, keyboard operation, shadowing and security.

Screen Shot: Phoenix – Award BIOS CMOS Setup Utility


Phoenix - AwardBIOS CMOS Setup Utility
Advanced BIOS Features
* CPU Feature [Press Enter]
* Hard Disk Boot Priority [Press Enter]
Virus Warning [Disabled]
CPU L3 Cache [Enabled]
Quick Power On Self Test [Enabled]
First Boot Device [USB-FDD]
Second Boot Device [Hard Disk]
Third Boot Device [USB-CDROM]
Boot Other Device [Enabled]
Boot Up NumLock Status [On]
Gate A20 Option [Fast]
Typematic Rate Setting [Disabled]
x Typematic Rate (Chars/Sec) 6
x Typematic Delay (Msec) 250
Security Option [Setup]
APIC Mode [Enabled]
MPS Version Control For OS [1.4]
OS Select For DRAM > 64MB [Non-OS2]
Console Redirection [Enabled]
Item Help
Menu Level *
F5: Previous Values
F6: Fail-Safe Defaults
F7: Optimized Defaults

- **Hard Disk Boot Priority**
  Select boot sequence
  Use < > or < > to select a device, then press<+> to move it up, or <-> to move it down the list. Press <ESC> to exit this menu.

- **Virus Warning**
  Allow you to choose the virus warning feature for IDE Hard Disk boot sector protection.

- **Quick Power On Self Test**
  This category speeds up Power On Self Test (POST) after you power up the computer. If it is set to Enable, BIOS will shorten or skip some check items during POST.

- **Boot Up Num Lock Status**
  Select power on state for Num Lock.

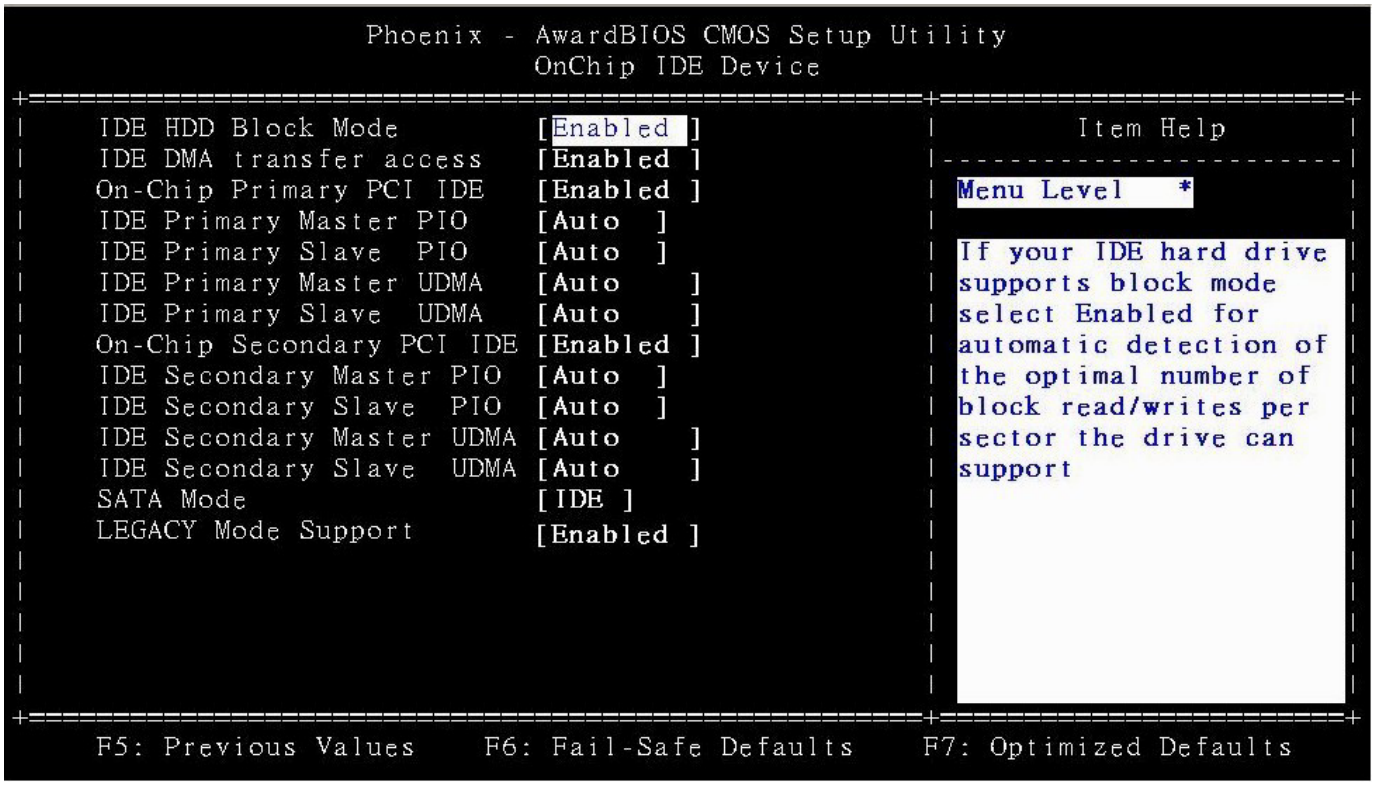
- **Console Redirection**
  Set the UNIX Console redirect to the terminal from COM1**.**
  The choice: Enabled/Disabled.

- **Baud Rate**
  Set the Console baud rate speed.
  The choice: 9600, 19200, 38400, 57600 and 115200.

✧ Integrated Peripherals

Phoenix - AwardBIOS CMOS Setup Utility
Integrated Peripherals
* OnChip IDE Device [Press Enter]
* SuperIO Device [Press Enter]
* Bypass&BPE Setting [Press Enter]
Watch Dog Timer Select [Disabled]
* USB Device Setting [Press Enter]
Item Help
Menu Level *
F5: Previous Values
F6: Fail-Safe Defaults
F7: Optimized Defaults

➢ **On Chip IDE Device**
Allow you can change IDE setting and SATA setting

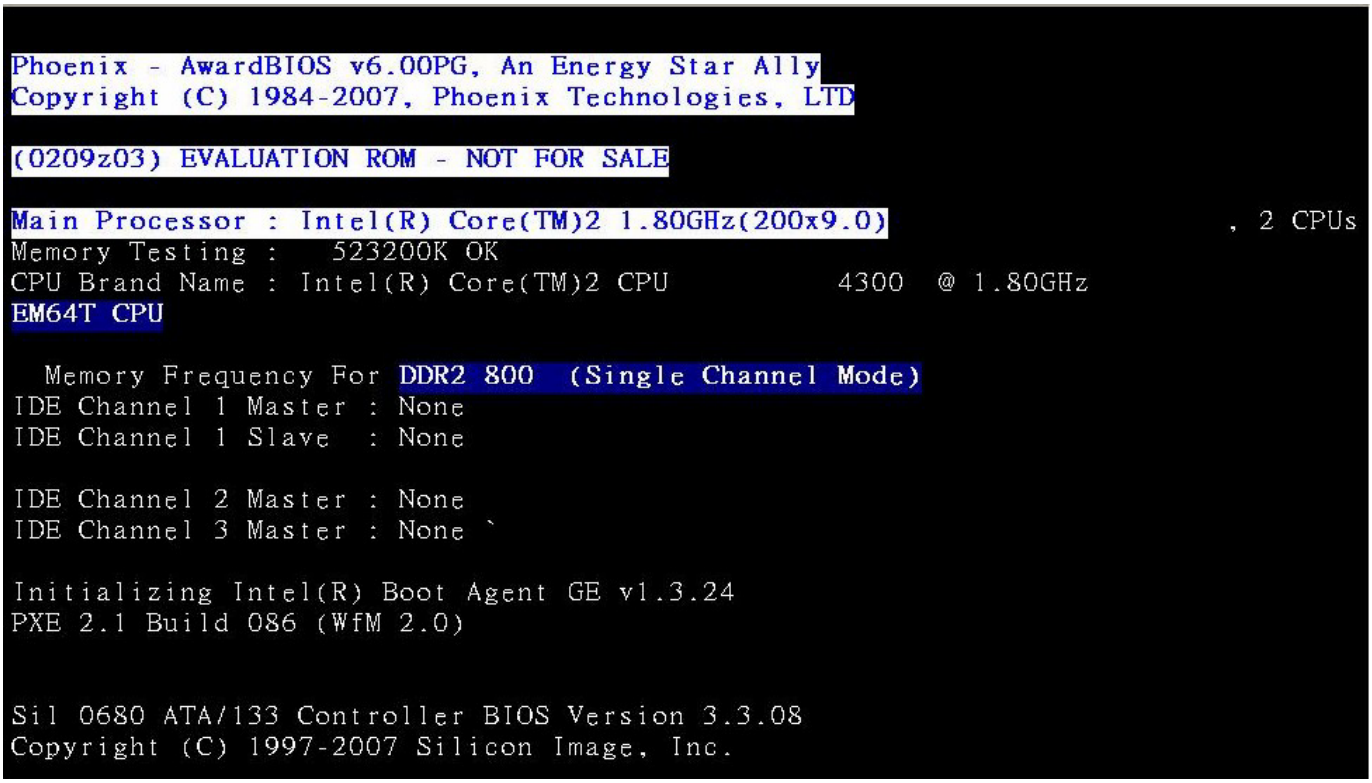

Phoenix - AwardBIOS CMOS Setup Utility
OnChip IDE Device
IDE HDD Block Mode [Enabled]
IDE DMA transfer access [Enabled]
On-Chip Primary PCI IDE [Enabled]
IDE Primary Master PIO [Auto]
IDE Primary Slave PIO [Auto]
IDE Primary Master UDMA [Auto]
IDE Primary Slave UDMA [Auto]
On-Chip Secondary PCI IDE [Enabled]
IDE Secondary Master PIO [Auto]
IDE Secondary Slave PIO [Auto]
IDE Secondary Master UDMA [Auto]
IDE Secondary Slave UDMA [Auto]
SATA Mode [IDE]
LEGACY Mode Support [Enabled]
Item Help
Menu Level *
If your IDE hard drive supports block mode select Enabled for automatic detection of the optimal number of block read/writes per sector the drive can support
F5: Previous Values
F6: Fail-Safe Defaults
F7: Optimized Defaults

(1)Allow you to disable or enable Primary /Secondary IDE, you can set the IDE PIO mode and Ultra DMA mode
(2)SATA Mode setting can let you change Serial ATA mode, you can find option " IDE"; "AHCI", "Raid ".
(3)LEGACY Mode Support must setting Enable Otherwise, the Linux can not be installed

➢ **SuperIO Device**
Allow you to change SuperIO setting in this sub menu

➢ **USB Device setting**
Allow you to enable or disable USB Controller, USB 2.0 Controller, USB Keyboard and USB Mouse Support

Onboard LAN BootROM


Phoenix - AwardBIOS v6.00PG, An Energy Star Ally
Copyright (C) 1984-2007, Phoenix Technologies, LTD
(0209z03) EVALUATION ROM - NOT FOR SALE
Main Processor : Intel(R) Core(TM)2 1.80GHz(200x9.0)
, 2 CPUs
Memory Testing : 523200K OK
CPU Brand Name : Intel(R) Core(TM)2 CPU 4300 @ 1.80GHz
EM64T CPU
Memory Frequency For DDR2 800 (Single Channel Mode)
IDE Channel 1 Master : None
IDE Channel 1 Slave : None
IDE Channel 2 Master : None
IDE Channel 3 Master : None
Initializing Intel(R) Boot Agent GE v1.3.24
PXE 2.1 Build 086 (WfM 2.0)
Sil 0680 ATA/133 Controller BIOS Version 3.3.08
Copyright (C) 1997-2007 Silicon Image, Inc.

User can press “L” for boot from LAN.

Load Optimal Defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. Select Load Optimal Defaults from the Exit menu and press <Enter>.

Load Fail-Safe Defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. The Fail-Safe settings are designed for maximum system stability, but not maximum performance. Select the Fail-Safe Setup options if your computer is experiencing system configuration problems.
Select Load Fail-Safe Defaults from the Exit menu and press <Enter>.

Appendix-A LED Signaling Standard

1. Power and Data-access LED

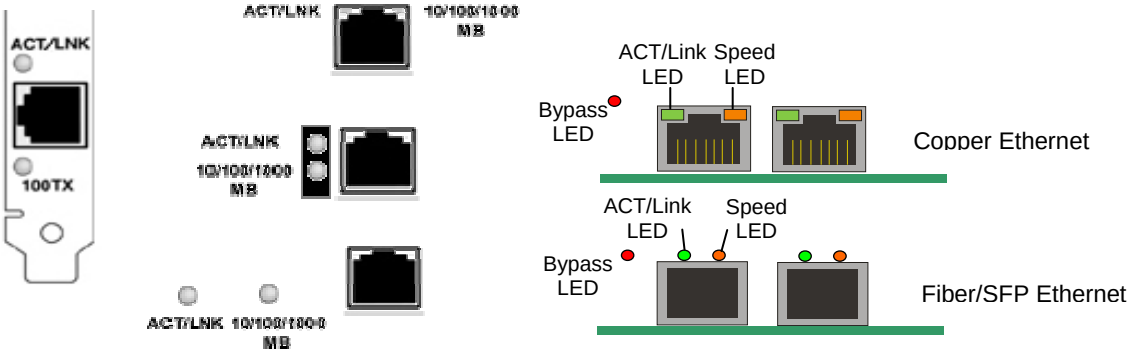
Lettering	Symbol	Function	Color	Signaling
PWR	⏻	Power status	Green	Off – No power, system off. On – Power good, system on.
Data Access	🛢	Data Access	Red	Off – no data access through IDE or SATA channel On – data is in transition through IDE or SATA channel

2. Ethernet LED

Label	Color	Indication	Status
ACT/LINK	**Green Or Others**	**On**	1. The Ethernet port is receiving power. 2. Good linkage between the Ethernet port and its supporting hub.
		Off	1. The adapter and switch are not receiving power. 2. No connection between both ends of network cable. 3. The drivers of Ethernet have not been loaded or does not function correctly.
	Green Or Others	**Flashing**	The adapter is sending or receiving network data. The frequency of the flashes varies with the amount of network traffic.
SPEED	**Yellow**	**On**	ACT/LNK LED must on then this LED show the operating at 1000 Mbps. If ACT/LINK is off and this function will be disable.
	Green	**On**	ACT/LNK LED must on then this LED show the operating at 100 Mbps. If ACT/LINK is off and this function will be disable.
		Off	ACT/LNK LED must on then this LED show the operating at 10 Mbps. If ACT/LINK is off and this function will be disable.

3. Bypass

Label	Color	Indication	Status
Bypass	**Green**	**On**	Normal mode.
		Flash	Software hang, bypass or open mode.
		off	Power fail, bypass or open mode.



Chapter 4 EZIO Programming Guide

4.1 About EZIO3

Proprietary keypad and LCD display interfaces are implemented in traditional computing system design, but they are usually different from system to system. The main purpose to roll this module out is to provide an easier human-machine interface for those computing systems regarding application friendly operation as a "must."

The design goals of this interface are:

- A single interface for those applications where both LCD display and keypad are required.
- This interface should be available in every computing system.
- The communication implementation should be OS independent.

Our solution is to use "Serial port" as the interface for both LCD display and keypad. A simple protocol is further defined so that applications can directly communicate with this module no matter what the Operating System is.

WARNING!

THE LCD DRIVER ICS ARE MADE OF CMOS PROCESS, DAMAGED BY STATIC CHARGE VERY EASILY. MAKE SURE THE USER IS GROUNDED WHEN HANDLING THE LCD.

4.2 Features

- Ideal user interface for communication appliance
- No driver required; OS independent
- Alphanumeric characters display support
- Four key pads can be customized for different applications
- Easy system installation and operation
- Clearly display system status
- Single interface to SBC or M/B

4.3 Technical Support Information

For further support, users may also contact Caswell's headquarter in Taipei or your local distributors.

Taipei Office Phone Number: +886-2-55911999

4.4 Mechanical Specification

Module Size (mm):	• 101.6(W) x 26.0(H) x 30.6(D) (max.)
Display Format:	• 16 characters x 2 lines
Character Size:	• 3.0 x 5.23 mm

4.5 General Specification

General Specification

Display Resolution:	• 16 characters x 2 lines
Dimensional Outline (mm):	• 101.6(W) x 26.0(H) x 30.6(D) (max.)
Function Key:	• Four operation keys (up, down, enter and ESC)
Display Icon:	• Eight self-defined icons
Interface:	• RS-232

Absolute Maximum Rating

Item	Symbol	Rating	Unit	Remarks
Storage temperature range	Tst	-30~80	°C	No condensation
Operating temperature range	Top	-20~70	°C	No condensation

4.6 Product Outlook

4.7 Interface Pin Assignment

There are only two connectors in this module, as shown in ***Figure C.2-1***: power connector and

Serial Port connector. The power source into this module is 5 volt only. There are only three pins used in the Serial Port interface (***Figure C.2-2***).

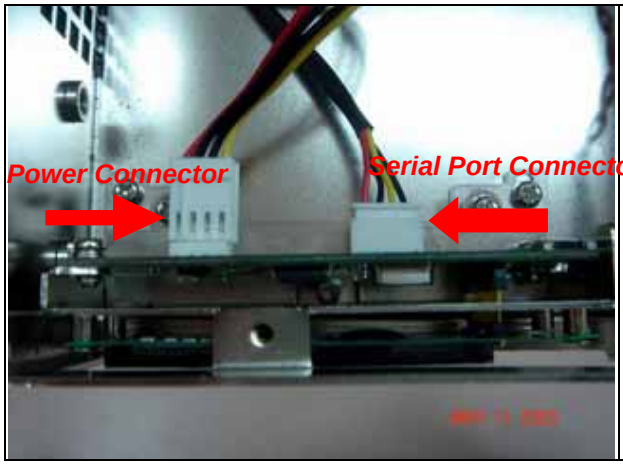
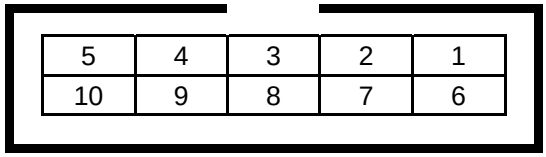


Fig. C.2-1 *Power connector and serial port connector of EZIO-100*



Pin 2: TxD Pin 3 : RxD Pin 5 : Ground

Fig. C.2-2 *Pin assignment*

In other words, the Serial Port is defined as DCE. Therefore, we can use a straight-through cable to connect it to the Serial Port of most of the computers, defined as DTE.

(1) Interface Pin Assignment

PIN NO.	PIN OUT	Description
1	NC	No connector
2	RXD	RS232 Data
3	TXD	RS232 Data
4	NC	No connector
5	V_{SS}	Ground
6	NC	No connector
7	NC	No connector
8	NC	No connector
9	NC	No connector
9	NC	No connector

(2) Power

PIN NO.	PIN OUT	Description
1	NC	No connector
2	GND	Power GND
3	GND	Power GND
4	+5V	Power VCC (+5V)

4.8 Hardware installation

The installation steps are:

- Connect the power connector to the power connector of this module.
  Connect the straight-through cable between Serial Port of this module and computer

4.9 EZIO3 Function Command

First, all versions (00A, 01A, 02A) of EZIO can use those commands. Only the 02A version of EZIO firmware that adds “FE 28” & “FE 37” command can control start of HEX & End of HEX.

EZIO is an intelligent device, which will display those data received from RS-232 port and reply key pressing status to polling command from RS-232 port. Both commands and data go thru RS-232 ports. To distinguish between data and commands, the LCD/key-pad module recognizes a command prefix, 254 (Hex 0FE). The byte following “254” will be processed as a command. For example, to clear the screen, send the command prefix (254) followed by the LCD clear-screen code (1). The valid data range is shown as the following table:

Valid data range	*Displayed characters*
0-7	Customized icon 0-7
48-57 (30-39 Hex)	0-9
65-90 (41-5A Hex)	A-Z
97-122 (61-7A Hex)	a-z

To get the key pressing status, a “read key” command can be issued to this module, which will check the key-pressing status and reply accordingly. The following are the commands and corresponding Decimal/Hex values:

	Functions/commands	*Decimal/Hex*	*Comment*
1.	Start Of HEX	40/28	Only for 02A
2.	End Of HEX	55/37	Only for 02A
3.	Clear screen	1/01	
4.	Home cursor	2/02	
5.	Read key	6/06	See note 1
6.	Blank display (retaining data)	8/08	
7.	Hide cursor & display blanked characters	12/0C	
8.	Turn on (blinking block cursor)	13/0D	
9.	Show underline cursor	14/0E	
10.	Move cursor 1 character left	16/10	
11.	Move cursor 1 character right	20/14	
12.	Scroll 1 character left	24/18	
13.	Scroll 1 character right	28/1C	
14.	Set display address (position the cursor) location	128 (Hex080)+ Location	See note 2
15.	Set character-generator address	64 (Hex 040)+ address	See note 3

Note 1: Upon receiving the “read key” command from host computer, the LCD/keypad module will check the status of every key and reply with status command accordingly. The replied message from LCD/key-pad module consists of a header and a status byte. The header byte is 253 (Hex0FD). The high nibble (with the most significant bit) of the status byte is always “4” and the low nibble (with the least significant bit) of the status byte is used to indicate key pressing status of the keypad module. This nibble will be “F” (of four 1s), if no key pressed while the “read key” received. “0” will be used to indicate key pressing status of corresponding key. There are four keys in this module – upper arrow, down arrow, enter (ENT), and escape (ESC). The relationship between the function key, corresponding status bit and status byte is shown as the table below

Function key	*Corresponding status bit*	*Status byte*

Escape	The fourth bit of lower nibble (the least significant bit) (1110)	B7 (H)
Up arrow	The third bit of lower nibble (1101)	BE (H)
Enter	The second bit of lower nibble (1011)	BB (H)
Down arrow	The first bit of lower nibble (0111)	BD (H)

More than one key can be pressed at the same time so that there may be more than one "0"s in the low nibble of status byte. For example, if Up and Down arrow keys are pressed at the same time while "read key" command received, the replied status will be "Hex045".

Note 2: This command can be used to place the cursor at any location. The corresponding address for each character on the screen is as follows:

For 16×2 Display Address

The addresses of characters at the same row are continuous, so moving cursor commands can be applied to shift the cursor position back and forth. However, the addresses of characters between upper and lower row are discontinuous. To change cursor position between upper row and lower row, this command will be applied.

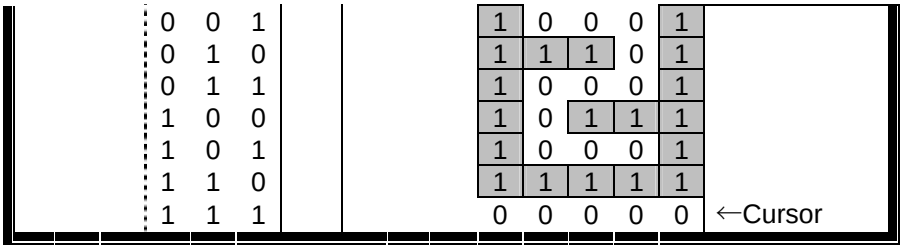
Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Location (Address)	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

The addresses of characters at the same row are continuous, so moving cursor commands can be applied to shift the cursor position back and forth. However, the addresses of characters between upper and lower row are discontinuous. To change cursor position between upper row and lower row, this command will be applied.

Note 3: This command can be used to create customized icon. The starting address is 64 and every character will take 8 bytes to create a 5(W) x 7(H) resolution picture, as shown belows:

CG RAM MAPPING

CG RAM Address (5 4 3 High, 2 1 0 Low)		Character Patterns (CG RAM data) (7 6 5 High, 4 3 2 1 0 Low)	
0 0 0	0 0 0	* * *	0 1 1 0 0
	0 0 1		1 0 0 1 0
	0 1 0		0 0 1 0 0 ←Character
	0 1 1		0 1 0 0 0 Pattern
	1 0 0		1 1 1 1 0
	1 0 1		0 0 0 0 0
	1 1 0		0 0 0 0 0
	1 1 1		0 0 0 0 0 ←Cursor
0 0 1	0 0 0	* * *	1 1 1 1 1
	0 0 1		1 0 0 0 1
	0 1 0		1 0 1 0 1 ←Character
	0 1 1		1 0 1 1 1 Pattern
	1 0 0		1 0 1 0 1
	1 0 1		1 0 0 0 1
	1 1 0		1 1 1 1 1
	1 1 1		0 0 0 0 0 ←Cursor
⋮ ⋮ ⋮	⋮ ⋮ ⋮	⋮ ⋮ ⋮	⋮ ⋮ ⋮ ⋮ ⋮
1 1 1	0 0 0	* * *	1 1 1 1 1 ←Character



To show the customized icon, simply send the data between "0" to "7" to this module

For example, this module will display the customized icon at location 64 to 71 upon receiving data "0"; white it will display the customized icon at location 72 to 79 upon receiving data"1".

Watchdog timer is also built in the module. This module will reset itself and send out "reset packet" (0FDH, 0EH) thereafter.

The input must be a standard RS-232 or inverted TTL signal. The RS-232 setting should be:

- *Baud rate: 2400 bps*
- *Parity: None*
- *Data bits: 8*
- *Stop bit: 1*

What follows is the default setup after LCD module initiated:

- 2-line display mode; every character is 5 x 8 dots.
- Display on; cursor off; cursor blink off.
- Display will be cleared.
- Shift right for entry mode.
- Set *address* counter to "00"(cursor position to 0)
- In entry mode.

4.10 Character Generator ROM (CGROM)

Lower 4 bits \ Upper 4 bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0000	CG RAM (1)															
0001	CG RAM (2)															
0010	CG RAM (3)															
0011	CG RAM (4)															
0100	CG RAM (5)															
0101	CG RAM (6)															
0110	CG RAM (7)															
0111	CG RAM (8)															
1000	CG RAM (1)															
1001	CG RAM (2)															
1010	CG RAM (3)															
1011	CG RAM (4)															
1100	CG RAM (5)															
1101	CG RAM (6)															
1110	CG RAM (7)															
1111	CG RAM (8)															

.

```
                                        /* ************************************
 * EZIO RS232 LCD Control Sample Program
 * ************************************
* ***************************************************************************
 * Company:          Portwell Inc.
 * Date:                     4/16/2003
 * Program:          02A.c
 * Version:          1.02
 * Compile:          Linux GNU C
 * Purpose:          Direct access to EZIO LCD, the program will display
 *                           messages according to the control button. The current
 *                           version only has the following function:
 *
 *                           1: display welcome message
 *                           2: display UP message if "scroll up" button is pressed
 *                           3: display ENTER message if "ENTER" button is pressed
 *                           4: display ESC message if "ESC" button is pressed
 *                           5: display DOWN message if "scroll down" button is pressed
 *
 * Program Overview:
 *
 *              - Parameters:
 *                           fd              : a file name for open() method, here represents the com port
 *                           Cmd             : command prefix
 *                           cls             : clear command
 *                           init            : initialize command
 *                           blank           : display blank screen
 *                           stopsend        : stop input/output
 *                           home            : move cursor to initial position
 *                           readkey         : set to read from EZIO
 *                           hide            : hide cursor & display blanked characters
 *                           movel           : move cursor one character left
 *                           mover           : move cursor one character right
 *                           turn            : turn on blinking-block cursor
 *                           show            : turn on underline cursor
 *                           scl             : scroll cursor one character left
 *                           scr             : scroll cursor one character right
 *                           setdis          : set character-generator address
 *
 *              - Procedure:
 *                           1. The program sets up the environment, i.e. com port settings.
 *                           2. The main function MUST call init() twice to initialize EZIO
 *                              before any communication.
 *                           3. For executing any command, the command prefix, Cmd, MUST be
 *                              called be command. So all command contains two parts, eg.
 *                              to initialize the sequence of HEX number is 0xFE, 0x25.
 *                           4. After clear screen and display welcome message, ReadKey()
 *                              method must be call to advise EZIO for reading data.
 *                           5. A pooling method is implemented to get input from EZIO while
 *                              any button is pressed.
 *
 *              - NOTE: This program is a sample program provided " AS IS" with NO
 *                           warranty.
 *
 * Copyright (c) Portwell, Inc. All Rights Reserved.
 *
 * ***************************************************************************/
#include <sys/stat.h>
#include <fcntl.h>
#include <unistd.h>
```

```
#include <stdlib.h>

static int fd;

void SetEnvironment () {
  system("stty ispeed 2400 < /dev/ttyS1");
  system("stty raw < /dev/ttyS1");
}

int Cmd = 254;  /* EZIO Command */
int cls = 1;    /* Clear screen */
void Cls () {
  write(fd,&Cmd,1);
  write(fd,&cls,1);
}

int init = 0x28;
void Init () {
  write(fd,&Cmd,1);
  write(fd,&init,1);
}

int stopsend = 0x37;
void StopSend () {
  write(fd,&Cmd,1);
  write(fd,&init,1);
}

int home = 2  ;   /* Home cursor */
void Home () {
  write(fd,&Cmd,1);
  write(fd,&home,1);
}

int readkey = 6         ;   /* Read key */
void ReadKey () {
  write(fd,&Cmd,1);
  write(fd,&readkey,1);
}

int blank = 8  ;   /* Blank display */
void Blank () {
  write(fd,&Cmd,1);
  write(fd,&blank,1);
}

int hide = 12  ;   /* Hide cursor & display blanked characters */
void Hide () {
  write(fd,&Cmd,1);
  write(fd,&hide,1);
}

int turn = 13  ;   /* Turn On (blinking block cursor) */
void TurnOn () {
  write(fd,&Cmd,1);
  write(fd,&turn,1);
}
int show = 14;   /* Show underline cursor */
void Show () {
  write(fd,&Cmd,1);
  write(fd,&show,1);
}

int movel = 16          ;   /* Move cursor 1 character left */
```

```
void MoveL () {
  write(fd,&Cmd,1);
  write(fd,&movel,1);
}

int mover = 20          ;   /* Move cursor 1 character right */
void MoveR () {
  write(fd,&Cmd,1);
  write(fd,&mover,1);
}

int scl = 24;       /* Scroll cursor 1 character left */
void ScrollL(){
  write(fd,&Cmd,1);
  write(fd,&scl,1);
}

int scr = 28;       /* Scroll cursor 1 character right */
void ScrollR(){
  write(fd,&Cmd,1);
  write(fd,&scr,1);
}

int setdis =  64;/* Command */
void SetDis(){
  write(fd,&Cmd,1);
  write(fd,&setdis,1);

 }


/* Add or Change Show Message here */
char mes1[] = "Portwell EZIO";
char mes2[] = "**************";
char mes3[] = "Up is selected";
char mes4[] = "Down is selected";
char mes5[] = "Enter is selected";
char mes6[] = "ESC is selected";
char nul[] = "                                        ";

int a,b;
void ShowMessage (char *str1 , char *str2) {
   a = strlen(str1);
   b = 40 - a;
   write(fd,str1,a);
   write(fd,nul,b);
   write(fd,str2,strlen(str2));
}

int main () {

  SetEnvironment(); /* Set RAW mode */

  fd = open("/dev/ttyS1" ,O_RDWR);/** Open Serial port (COM2) */

          Init(); /* Initialize EZIO twice */
        Init();

          Cls();  /* Clear screen */
          ShowMessage(mes1,mes2);

   while (1) {
     int res;
     char buf[255];
```

```
    SetDis();
    ReadKey(); /* sub-routine to send "read key" command */
    res = read(fd,buf,255); /* read response from EZIO */

    switch(buf[1]) {       /* Switch the Read command */

        case 0xBE :  /* Up Botton was received */
                    Cls();
                ShowMessage(mes1,mes3); /** display "Portwell EZIO" */
                break;                  /** display "Up is selected */


      case 0xBD :     /** Down Botton was received */
                Cls();
                ShowMessage(mes1,mes4);  /** display "Portwell EZIO" */
                break;                   /** display "Down is selected" */

      case 0xBB :     /** Enter Botton was received */
                Cls();
                ShowMessage(mes1,mes5);  /** display "Portwell EZIO" */
                break;                   /** display "Enter is selected" */

      case 0XB7 :     /** Escape Botton was received */
                Cls();
                ShowMessage(mes1,mes6);  /** display "Portwell EZIO" */
                break;                   /** display "Escape is selected */
     }

  }
}
```